Listing of Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. (Currently amended) SYSTEM FOR MEASUREMENT OF OPTICAL PARAMETERS AND CHARACTERIZATION OF MULTIPORT OPTICAL DEVICES ~~constituted by~~ comprising ~~process control systems, one or more sources of optical test signal (~~at least one tunable laser source responsive to a process control system and providing an optical signal to ~~), optical circuit including optical fiber and several other optical components arranged so as to constitute~~ an ~~interferometric~~ optical interferometer , the interferometer splitting the optical signal into a first optical signal and a second optical signal, the interferometer connected to a port of a device under test receiving the first optical signal through a path of the interferometer and a modulator receiving the second optical signal on a second path of the interferometer, an optical detection system connected to the optical interferometer for heterodyning the first optical signal and modulated second optical signal for transmission to a data acquisition circuit ~~arrangement, optical connectors, optoeletronic interfaces, photodetectors, analogical electronic circuits, digital electronic circuits for digital signal processing and electronic circuits for data acquisition, characterized by the fact that the test and reference optical signals traverse paths with any lengths, that can be identical or distinct, the optical signal traversing at least one of said paths of interferometer being phase- and/or frequency-modulated~~.

2. (Currently amended) A METHOD FOR MEASUREMENT OF OPTICAL PARAMETERS AND CHARACTERIZATION OF MULTIPORT OPTICAL DEVICES ~~based in optical interferometry concept, using~~ comprising the steps of providing at least one laser source, splitting a signal from the laser source into two optical paths, ~~in which in one of these the~~ inserting in a first of the two optical paths a device under test (DUT), ~~is inserted, and in which one or more~~ inserting in a second of the two optical paths at least one optical modulator forming an interferometer, ~~phase / frequency modulators are inserted, characterized by the fact that~~ summing the signals of both paths ~~arms are summed~~ at a ~~same~~ photodetector ~~that translates~~ thereby translating to the electric domain

~~the~~ by heterodyning of the optic signals, which contain the information of the optical reflection characteristics of the DUT.

3. (Currently amended) THE METHOD FOR MEASUREMENT OF OPTICAL PARAMETERS AND CHARACTERIZATION OF MULTIPORT OPTICAL DEVICES as claimed in claim 2, ~~characterized by the fact that the system operates equally well with continuous wavelength sweeping as with step~~ wherein the at least one tunable laser source employs stepped wavelength sweeping ~~of the tunable laser source~~.

4. (Currently amended) THE METHOD FOR MEASUREMENT OF OPTICAL PARAMETERS AND CHARACTERIZATION OF MULTIPORT OPTICAL DEVICES as claimed in claim 2, ~~characterized by the capability of simultaneous interferometric characterization in reflection and transmission of all ports of multi-port optical devices using phase and/or frequency optical modulators in the arms of the interferometer interferometer~~ further comprising the steps of combining an optical output signal from the device under test with an optical output signal of the modulator to form a second interferometer, summing the optical output signal from the device under test and the optical output signal from the modulator in a second photodetector thereby translating to the electric domain by heterodyning of the optical signals containing the information of the optical transmission characteristics of said device under test .

5. (Currently amended) THE METHOD FOR MEASUREMENT OF OPTICAL PARAMETERS AND CHARACTERIZATION OF MULTIPORT OPTICAL DEVICES as claimed in claim 4, ~~characterized by the capability of~~ further comprising the step of determining the polarization characteristics of the DUT for ~~the~~ two orthogonal polarization modes of light, the polarization discrimination being provided by ~~distinct phase and/or frequency~~ the optical modulator~~s~~ installed in the interferometer arm~~s~~.

6. (Currently amended) THE METHOD FOR MEASUREMENT OF OPTICAL PARAMETERS AND CHARACTERIZATION OF MULTIPORT OPTICAL DEVICES as claimed in claim 2, ~~characterized by the fact that~~ further comprising the step of describing the transfer function of the optical signals between the diverse ports of the DUT ~~is described~~ by means of the Optical "S"-Parameters where each "S_{xy}" parameter is represented using the formalism of Jones (Jones matrix) and/or the formalism of Müller

(Müller matrix) and where all the determinations of the optical characteristics of the DUT ~~(bandwidth, phase, time delay, chromatic dispersion, 2nd order chromatic dispersion, reflectance, reflection coefficient, transmittance of the port "y" to the port "x" and vice versa, transmission coefficient of the port "y" to the port "x" and vice versa, insertion loss, polarization dependent loss, polarization mode dispersion (DGD/PMD), 2nd order DGD, etc.)~~ are based on said "S_{xy}" parameters.

7. (Currently amended) THE METHOD FOR MEASUREMENT OF OPTICAL PARAMETERS AND CHARACTERIZATION OF MULTIPORT OPTICAL DEVICES as claimed in claim 4, ~~characterized by the fact of the measurement of the~~ further comprising the step of measuring different optical parameters in the different propagation paths ~~is furnished~~ by the arrangement of the optical ~~interferometric~~ circuits of the interferometers according to ~~different~~ selected optical configurations, each individual configuration corresponding to the measurement of a specific optical "S"-parameter of interest.

8. (Currently amended) THE METHOD FOR MEASUREMENT OF OPTICAL PARAMETERS AND CHARACTERIZATION OF MULTIPORT OPTICAL DEVICES as claimed in claim 7, ~~characterized by the fact of~~ wherein the optical ~~interferometric circuitry is~~ circuits of the interferometers are obtained by ~~equivalent to the~~ overlapping several individual optical configurations related to the simultaneous measurement of several optical "S"-parameters.

9. cancelled

10. (Currently amended) THE METHOD FOR MEASUREMENT OF OPTICAL PARAMETERS AND CHARACTERIZATION OF MULTIPORT OPTICAL DEVICES as claimed in claim 4, ~~characterized by the fact of the~~ further comprising the step of stabilizing the ~~interferometric~~ optical circuits of the interferometer ~~stabilization~~ against thermal variations or mechanical vibration ~~is provided by means of the use of~~ by providing ~~a second~~ an additional interferometer operating within the optical test circuits, functioning in a wavelength falling outside the test wavelength band, and operating according to ~~the~~ wavelength division multiplexing (WDM) ~~(wavelength division multiplexing)~~ techniques.

11. (currently amended) THE SYSTEM FOR MEASUREMENT OF OPTICAL PARAMETERS AND CHARACTERIZATION OF MULTIPORT OPTICAL DEVICES as claimed in claim 1, ~~characterized by the fact of~~ wherein the optical interferometer ~~can be comprised of~~ incorporates ~~different~~ physical paths for propagation and conduction of the optical signal, ~~such as:~~ selected from the set of optical fibers, planar waveguides, and free space optics (FSO).

12. (currently amended) THE SYSTEM FOR MEASUREMENT OF OPTICAL PARAMETERS AND CHARACTERIZATION OF MULTIPORT OPTICAL DEVICES as claimed in ~~claims~~ claim 1 ~~or 10~~, ~~characterized by the use of optical phase and/or frequency modulators in the arms of the interferometer, said modulators being~~ wherein the modulator is constructed ~~according to using any known possible technologies, such as techniques of~~ by use of techniques selected from the set of refractive index change, acusto-optic effect in crystals, length propagation changes, and ~~electron-optic~~ electro-optic effect.

13. (currently amended) THE SYSTEM FOR MEASUREMENT OF OPTICAL PARAMETERS AND CHARACTERIZATION OF MULTIPORT OPTICAL DEVICES as claimed in claim 11, ~~characterized by the use of optical phase and/or frequency modulators in the arms of the interferometer, said modulators being~~ wherein the modulator is constructed ~~according to using any known possible technologies, such as~~ by use of techniques selected from the set of refractive index change, acusto-optic effect in crystals, length propagation changes, and electro~~n~~-optic effect.

14. (New) THE SYSTEM FOR MEASUREMENT OF OPTICAL PARAMETERS AND CHARACTERIZATION OF MULTIPORT OPTICAL DEVICES as claimed in claim 1 wherein the optical interferometer comprises a first optical path, an optical coupler connected to the first optical path and splitting the optical signal into the first optical signal provided through a second optical path to an input port of the device under test and the second optical signal provided through a third optical path to the modulator, a fourth optical path connected to the modulator for transmission of a modulated optical signal for reflection from a mirror and returned through said optical coupler, said first optical signal being reflected from said device under test and returned through said optical coupler, a fourth optical path connected to said optical coupler and

receiving the reflected modulated signal and the reflected first optical signal for heterodyning the reflected first optical signal and modulated optical signal.

15. (New) THE SYSTEM FOR MEASUREMENT OF OPTICAL PARAMETERS AND CHARACTERIZATION OF MULTIPORT OPTICAL DEVICES as claimed in claim 1 wherein the optical interferometer comprises a first optical path, an optical coupler connected to the first optical path and splitting the optical signal into the first optical signal provided through a second optical path to an input port of the device under test and the second optical signal provided through a third optical path to the modulator, a fourth optical path connected to the modulator for transmission of a modulated optical signal, a second optical coupler, a fifth optical path connected to an output port of the device under test and the second optical coupler, said first optical signal being transmitted through said device under test and returned through said second optical coupler, a sixth optical path connected to said second optical coupler and receiving the modulated optical signal and the transmitted first optical signal for heterodyning the first optical signal and modulated optical signal.

16. (new) THE METHOD FOR MEASUREMENT OF OPTICAL PARAMETERS AND CHARACTERIZATION OF MULTIPORT OPTICAL DEVICES as claimed in claim 2, further comprising the step of measuring different optical parameters in the different propagation paths by the arrangement of the optical circuits of the interferometer according to selected optical configurations, each individual configuration corresponding to the measurement of a specific optical "S"-parameter of interest.

17. (new) THE METHOD FOR MEASUREMENT OF OPTICAL PARAMETERS AND CHARACTERIZATION OF MULTIPORT OPTICAL DEVICES as claimed in claim 2, further comprising the step of determining the polarization characteristics of the DUT for ~~the~~ two orthogonal polarization modes of light, the polarization discrimination being provided by the optical modulators installed in the interferometer arm.

18. (new) THE METHOD FOR MEASUREMENT OF OPTICAL PARAMETERS AND CHARACTERIZATION OF MULTIPORT OPTICAL DEVICES

as claimed in claim 2, further comprising the step of stabilizing the optical circuits of the interferometer against thermal variations or mechanical vibration by providing an additional interferometer operating within the optical test circuits, functioning in a wavelength falling outside the test wavelength band, and operating according to wavelength division multiplexing (WDM) techniques.